

## **Carbonate Reservoir Field Experiments in Extreme Steam Conditions, Bahrain Field**

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### **Abstract**

Starting late 2011, high temperature and high-pressure steam pilots were initiated in two Bahrain carbonate reservoirs. The first thermal pilot started in December 2011 within the Rubble Reservoir, in a 7 well horizontal and vertical well configuration, covering 1 to 3 acre spacing. The second pilot started in December 2012 within the Mauddud Reservoir also through a 7 well horizontal and vertical test configuration covering 5 acres. Both carbonate thermal pilots progressed through pilot expansion or modification phases over the last 4 years, and were both technically successful in mobilizing and recovering oil and successfully reduced residual oil to expected thermal recovery end points. Currently, the Rubble and Mauddud thermal projects are undergoing expansion for field economic appraisal.

The focus of this presentation is on the Mauddud Steam Pilot. The presentation will describe the geologic environment, initial pilot design, changes made to the pilot through systematic analysis, and timely achieved final technical success results. The systematic analysis permitted successful pilot execution, pilot technical success and initiation of economic appraisal expansion in the amazingly short time period of approximately 2.5 years. Most astonishing, is this pilot is unconventional thermal recovery; there are no suitable analogs to tight fractured carbonate light oil thermal recovery.